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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,827	10/29/2003	Stephen Ivor Hall		2485

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EXAMINER

STRICKLAND, JONAS N

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 04/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,827

Applicant(s)

HALL ET AL.

Examiner

Jonas N. Strickland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28 is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-20 and 22-26 is/are rejected.
- 7) ☒ Claim(s) 11, 21 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/485,566.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 1-5, 7, 8, 12-20, 22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoard (US Patent 5,746,984) in view of Kong et al. (US Patent 5,427,747).

Applicant claims with respect to claims 1-3, 5, 7, 8, 12-17, 19, 20, 22, 24, and 25 a method of treating a gaseous medium including nitrogenous oxides to remove the nitrogenous oxides therefrom, which method comprises the operations of activating a gaseous hydrocarbon for achieving partial oxidation by generating an electric discharge in the gaseous hydrocarbon in the presence of a gas permeable first material which has oxidative properties in the presence of a non-thermal plasma and contacting a combination of the activated hydrocarbon and gaseous medium with a second material adapted in the presence of the activated hydrocarbon to catalyze the reduction of the nitrogenous oxides in the gaseous medium to nitrogen.

Hoard discloses a method and a reactor system for the plasma-assisted treatment of a gaseous medium including nitrogenous oxides to remove the nitrogenous oxides therefrom (see Figures 2 and 4). The system comprises a gas permeable body (5) in Figure 2 and the Electrified packed bed in Figure 4, including a first material and the presence of a non-thermal plasma, wherein a gaseous medium including a gaseous hydrocarbon there through; a gas permeable body (3) including a second material to catalyze the reduction to nitrogen of nitrogenous oxides contained in the gaseous medium; and means (col. 6, lines 36-57) for applying to the first material a potential sufficient to excite an electric discharge in a gaseous hydrocarbon passing through the body including the first material. However, Hoard fails to disclose that the gas

permeable body (5), with a first material is adapted in the presence of non-thermal plasma, for achieving partial oxidation the gaseous hydrocarbon in the gaseous medium.

As shown in Figure 1, Kong et al teaches a method for producing oxygenates from hydrocarbons, that comprises the production of activated hydrocarbons from passing a source of hydrocarbon (30) through a plasma reactor (10) having a dielectric material (26) with oxidative properties (col. 2, line 68 – col. 3, line 2; also see col. 5). Since the plasma reactor of Hoard has the same dielectric material, it would have been obvious to one having ordinary skill in the art at the time of the invention, to have realized that the plasma reactor in Hoard would also produce activated hydrocarbons needed to remove harmful emissions from a gaseous medium such as the exhaust gas from an internal combustion engine.

With respect to claim 2, the gaseous medium in the method according to Hoard includes carbonaceous particulate material and the gaseous medium is subjected to oxidation by the first material (see Abstract). With respect to claim 3, the hydrocarbon in the method according to Hoard is added to the gaseous medium through rich spikes (col. 8, lines 36-38). With respect to claims 4 and 18, Hoard discloses wherein the first and second materials are particulate and are intimately mixed. With respect to claims 5 and 19, as shown in Figure 3, in the method according to Hoard, the first and second materials, (5) and (8), respectively, are confined to separate regions of a reactor system and the gaseous medium and hydrocarbon are passed through the region containing the first material before the region containing the second material. With respect to

claims 7, 8, and 24, the second material in the method according to Hoard is selected from gamma alumina, which is photo-catalytic (col. 8, lines 8-14).

With respect to claims 14 and 15, the gaseous medium in the method according to Hoard is the exhaust emissions from an internal combustion engine, which can contain unburnt hydrocarbons.

With respect to claim 12, in the method according to Hoard, the second material is a metal-doped zeolite containing a material adapted to produce catalysis promoting cations (col. 7, lines 50-52). With respect to claims 13 and 25, in the method and system according to Hoard, the zeolite second material also contains lanthanum (col. 7, lines 48-50). With respect to claims 17 and 22, as illustrated in Figure 2, the first and second materials in the reactor system according to Hoard are particulate in form and are mixed together. In this way, there is included means for establishing an electrical discharge in the gaseous medium within the interstices of the gas permeable body of the second material.

5. Claims 6, 9, 10, 23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoard in view of Kong as applied to claims 1 and 16 respectively above, and further in view of Yonemura et al. (US Patent 5,194,078).

The method and the reactor system according to Hoard disclose the invention as cited above, however, fail to disclose that the first material is barium or calcium titanate and the second material is titanium dioxide or cerium dioxide.

Yonemura et al. teaches an exhaust filter element and exhaust gas treating apparatus that includes a filter (1) having a highly dielectric material that comprises

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titanium dioxide and calcium titanate (col. 9, lines 56-61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made, to have utilized the filter taught by Yonemura et al. in the method and system of Hoard, since the use thereof would have provided a more effective purification method and system to remove harmful emissions from exhaust gas.

Allowable Subject Matter

6. Claim 28 is allowed.

7. The following is an examiner's statement of reasons for allowance: The cited prior art fails to disclose a reactor system for the plasma assisted treatment of plasma assisted treatment of a gaseous medium, wherein the reactor has a means for establishing an electrical discharge in the gaseous medium in the interstices of the bed of the first material in the reactor to effect the oxidation of the particulate carbonaceous material.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Claims 11, 21 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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9. The following is a statement of reasons for the indication of allowable subject matter: The cited prior art fails to disclose wherein the second material is a mixture of equal parts by weight of anatase titania and zirconia. This limitation is not disclosed or taught in the cited prior art, wherein there is equal volume of an anatase and zirconia mixture.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 5,843,288; US Patent 5,942,195; US Patent 6136278; US Patent 6176078; US Patent 6238525.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonas N. Strickland whose telephone number is 571-272-1359. The examiner can normally be reached on M-TH, 7:30-5:00, off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonas N. Strickland
April 15, 2005



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